

Package ‘DDIwR’

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Title DDI with R

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readxl, writexl

Description

Useful functions for various DDI (Data Documentation Initiative) related inputs and outputs. Converts data files to and from SPSS, Stata, SAS, R and Excel, including user declared missing values.

License GPL (>= 2)

URL <https://github.com/dusadrian/DDIwR>

BugReports <https://github.com/dusadrian/DDIwR/issues>

NeedsCompilation no

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DDIwR-package	<i>Useful functions for various DDI (Data Documentation Initiative) related outputs.</i>
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Description

This package provides various functions to read DDI based metadata documentation, and write dedicated setup files for R, SPSS, Stata and SAS to read an associated .csv file containing the raw data, apply labels for variables and values and also deal with the treatment of missing values.

It can also generate a DDI metadata file out of an R information object, which can be used to export directly to the standard statistical packages files (such as SPSS, Stata and SAS, or even Excel), using the versatile package **haven**. For R, the default object to store data and metadata is a `data.frame`, and labelled data are automatically coerced to class declared.

The research leading to the initial functions in this package has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement no. 262608 (DwB - Data without Boundaries)

Details

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convert	<i>Convert a dataset from one statistical software to another</i>
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Description

This function converts (or transfers) between R, Stata, SPSS, SAS, Excel and DDI XML files. Unlike the regular import / export functions from packages **haven** or **rio**, this function uses the DDI standard as an exchange platform and facilitates a consistent conversion of the missing values.

Usage

```
convert(from, to = NULL, declared = TRUE, recode = TRUE, embed = TRUE, ...)
```

Arguments

from	A path to a file, or a data frame object
to	Character, the name of a software package or a path to a specific file
declared	Logical, return the resulting data frame as a declared object
recode	Logical, recode missing values
embed	Boolean, embed the data when generating a DDI XML file
...	Additional parameters passed to exporting functions, see the Details section

Details

When the argument to specifies a certain statistical package ("R", "Stata", "SPSS", "SAS") or "Excel", the name of the destination file will be identical to the one in the argument from, with an automatically added software specific extension.

Alternatively, the argument to can be specified as a path to a specific file, in which case the software package is determined from its file extension. The following extensions are currently recognized: .xml for DDI, .rds for R, .dta for Stata, .sav for SPSS, .sas7bdat for SAS, and .xlsx for Excel.

Additional parameters can be specified via the three dots argument ..., that are passed to the respective functions from packages **haven** and **readxl**. For instance the function `write_dta()` has an additional argument called `version` when writing a Stata file.

The most important argument to consider is called `user_na`, part of the function `read_sav()`. Although it is defaulted to `FALSE` in package **haven**, in package **DDIwR** it is used as having the value of `TRUE`. Users who really want to deactivate it should explicitly specify `use_na = FALSE` in function `{convert}()`.

If the argument to is left to `NULL`, the data is (invisibly) returned to the R environment. Conversion to R, either in the working space or as a data file, will result (by default) in a data frame containing declared labelled variables, as defined in package **declared**.

The current version reads and creates DDI Codebook version 2.5, with future versions to extend the functionality for DDI Lifecycle versions 3.x and link to the future package **DDI4R** for the UML model based version 4. It extends the standard DDI Codebook by offering the possibility to embed a CSV version of the raw data into the XML file containing the Codebook, into a notes child of the `fileDscr` component. This type of Codebook is unique to this package and automatically detected when converting to another statistical software.

Converting the missing values to SAS is not tested, but it relies on the same package **haven** using the `ReadStat C` library. Should it not work, it is also possible to use a setup file produced by function `setupfile()` and run the commands manually.

When the argument `embed` is deactivated, a CSV file will be produced in the same directory, using the same file name as the XML file.

The argument `recode` controls how missing values are treated. If the input file has SPSS like numeric codes, they will be recoded to extended (a-z) missing types when converting to Stata or SAS. If the input has Stata like extended codes, they will be recoded to SPSS like numeric codes.

Author(s)

Adrian Dusa

References

DDI - Data Documentation Initiative, see <https://ddialliance.org/>

See Also

[setuploadfile](#), [getMetadata](#), [declared](#), [labelled](#)

Examples

```
## Not run:
# Assuming an SPSS file called test.sav is located in the working directory
# the following command will extract the metadata in a DDI Codebook and
# produce a test.xml file in the same directory
convert("test.sav", to = "DDI")

# It is possible to include the data in the XML file, using:
convert("test.sav", to = "DDI", embed = TRUE)

# To produce a Stata file:
convert("test.sav", to = "Stata")

# To produce an R file:
convert("test.sav", to = "R")

# To produce an Excel file:
convert("test.sav", to = "Excel")

## End(Not run)
```

exportDDI

Export to a DDI metadata file

Description

This function creates a DDI version 2.5, XML file structure.

Usage

```
exportDDI(codebook, file = "", embed = TRUE, OS = "", indent = 4)
```

Arguments

codebook	A list object containing the metadata, or a path to a directory where these objects are located, for batch processing
file	either a character string naming a file or a connection open for writing. "" indicates output to the console.
embed	Embed the CSV datafile in the XML file, if present.
OS	The target operating system, for the eol - end of line character(s)
indent	Indent width, in number of spaces

Details

The information object is essentially a list having two main list components:

- fileDscr, if the data is provided in a subcomponent named datafile
- dataDscr, having as many components as the number of variables in the (meta)data. For each variable, there should a mandatory subcomponent called label (that contains the variable's label) and, if the variable is of a categorical type, another subcomponent called values.

Additional informations about the variables can be specified as further subcomponents, combining DDI specific data but also other information that might not be covered by DDI:

- measurement is the equivalent of the specific DDI attribute nature of the var element, and it accepts these values: "nominal", "ordinal", "interval", "ratio", "percent", and "other".
- type is useful for multiple reasons. A first one, if the variable is numerical, is to differentiate between discrete and contin values of the attribute intrvl from the same DDI element var. Another reason is to help identifying pure string variables (containing text), when the subcomponent type is equal to "char". It is also used for the subelement varFormat of the element var. Finally, another reason is to differentiate between pure categorical ("cat") and pure numerical ("num") variables, as well as mixed ones, among which "numcat" referring to a numerical variable with very few values (such as the number of children), for which it is possible to also produce a table of frequencies along the numerical summaries. There are also categorical variables that can be interpreted as numeric ("catnum"), such as a Likert type response scale with 7 values, where numerical summaries are also routinely performed along with the usual table of frequencies.
- missing is an important subcomponent, indicating which of the values in the variable are going to be treated as missing values, and it is going to be exported as the attribute missing of the DDI subelement catgry.

There are many more possible attributes and DDI elements to be added in the information object, future versions of this function will likely expand.

For the moment, only DDI codebook version 2.5 is exported, but DDI Lifecycle is also possible.

The argument OS can be either:

"windows" (default), or "Windows", "Win", "win",
 "MacOS", "Darwin", "Apple", "Mac", "mac",
 "Linux", "linux".

The end of line separator changes only when the target OS is different from the running OS.

The argument indent controls how many spaces will be used in the XML file, to indent the different subelements.

Value

An XML file containing a DDI version 2.5 metadata.

See Also

https://ddialliance.org/Specification/DDI-Codebook/2.5/XMLSchema/field_level_documentation.html

Examples

```
codeBook <- list(dataDscr = list(
  ID = list(
    label = "Questionnaire ID",
    type = "num",
    measurement = "interval"
  ),
  V1 = list(
    label = "Label for the first variable",
    labels = c(
      "No" = 0,
      "Yes" = 1,
      "Not applicable" = -97,
      "Not answered" = -99),
    na_values = c(-99, -97),
    type = "cat",
    measurement = "nominal"
  ),
  V2 = list(
    label = "Label for the second variable",
    labels = c(
      "Very little" = 1,
      "Little" = 2,
      "So, so" = 3,
      "Much" = 4,
      "Very much" = 5,
      "Don't know" = -98),
    na_values = c(-98),
    type = "cat",
    measurement = "ordinal"
  ),
  V3 = list(
    label = "Label for the third variable",
    labels = c(
      "First answer" = "A",
      "Second answer" = "B",
      "Don't know" = -98),
    na_values = c(-98),
    type = "cat",
    measurement = "nominal"
  ),
  V4 = list(
    label = "Number of children",
```

```

    labels = c(
      "Don't know"      = -98,
      "Not answered"   = -99),
    na_values = c(-99, -98),
    type = "numcat",
    measurement = "ratio"
  ),
  V5 = list(
    label = "Political party reference",
    type = "char",
    txt = "When the respondent indicated his political party reference, his/her open response
was recoded on a scale of 1-99 with parties with a left-wing orientation coded on the low end
of the scale and parties with a right-wing orientation coded on the high end of the scale.
Categories 90-99 were reserved miscellaneous responses."
  )))

## Not run:
exportDDI(codeBook, file = "codebook.xml")

## End(Not run)

```

getMetadata

Extract metadata information

Description

Extract a list containing the variable labels, value labels and any available information about missing values.

Usage

```
getMetadata(x, save = FALSE, OS = "Windows", ...)
```

Arguments

x	A path to a file, or a data frame object
save	Boolean, save an .R file in the same directory
OS	The target operating system, for the eol - end of line separator, if saving the file
...	Additional arguments for this function (internal uses only)

Details

This function reads an XML file containing a DDI codebook version 2.5, or an SPSS or Stata file and returns a list containing the variable labels, value labels, plus some other useful information.

It additionally attempts to automatically detect a type for each variable:

cat: categorical using numeric values

catchar: categorical using character values
 num: numerical
 numcat: numerical variable with very few values (ex. number of children)
 for which a table of frequencies is possible in addition to frequencies

By default, this function extracts the metadata into an R list object, but when the argument `save` is activated, the argument `OS` (case insensitive) can be either:

"Windows" (default), or "Win",
 "MacOS", "Darwin", "Apple", "Mac",
 "Linux".

The end of line separator changes only when the target OS is different from the running OS.

For the moment, only DDI version 2.5 (Codebook) is supported, but DDI Lifecycle is planned to be implemented.

Value

A list containing all variables, their corresponding variable labels and value labels, and (if applicable) missing values if imported and found.

Author(s)

Adrian Dusa

Examples

```
x <- data.frame(
  A = declared(
    c(1:5, -92),
    labels = c(Good = 1, Bad = 5, NR = -92),
    na_values = -92
  ),
  C = declared(
    c(1, -91, 3:5, -92),
    labels = c(DK = -91, NR = -92),
    na_values = c(-91, -92)
  )
)

getMetadata(x)$dataDscr
```

recodeValues

Recode missing values

Description

A function to recode all missing values to either SPSS or Stata types, uniformly (re)using the same codes across all variables.

Usage

```
recodeValues(dataset, to = c("SPSS", "Stata"), dictionary = NULL, chartonum = TRUE, ...)
```

Arguments

dataset	A data frame
to	Software to recode missing values for
dictionary	A named vector, with corresponding SPSS values and Stata codes.
chartonum	Logical, replace character values with numbers.
...	Other internal arguments.

Details

When a dictionary is not provided, it is automatically constructed from the available data and meta-data, using negative numbers starting from -91 and up to 27 letters starting with "a".

If the dataset contains mixed variables with SPSS and Stata style missing values, unless otherwise specified in a dictionary it uses other codes than the existing ones.

For the SPSS type of missing values, the resulting variables are coerced to a declared labelled format.

Unlike SPSS, Stata does not allow labels for character values. Both cannot be transported from SPSS to Stata, it is either one or another. If labels are more important to preserve than original values (especially the information about the missing values), the argument `char tonum` replaces all character values with suitable, non-overlapping numbers and adjusts the labels accordingly.

If no labels are found in the metadata, the original values are preserved.

Value

A data frame with all missing values recoded consistently.

Examples

```
x <- data.frame(
  A = declared(
    c(1:5, -92),
    labels = c(Good = 1, Bad = 5, NR = -92),
    na_values = -92
  ),
  B = labelled(
    c(1:5, tagged_na('a')),
    labels = c(DK = tagged_na('a'))
  ),
  C = declared(
    c(1, -91, 3:5, -92),
    labels = c(DK = -91, NR = -92),
    na_values = c(-91, -92)
  )
)
```

```
#      A      B      C
# 1    1      1      1
# 2    2      2 NA(-91)
# 3    3      3      3
# 4    4      4      4
# 5    5      5      5
# 6 NA(-92) NA(a) NA(-92)
```

```
xrec <- recodeValues(x, to = "Stata")
```

```
#      A      B      C
# 1    1      1      1
# 2    2      2 NA(b)
# 3    3      3      3
# 4    4      4      4
# 5    5      5      5
# 6 NA(c) NA(a) NA(c)
```

```
attr(xrec, "dictionary")
```

```
#  b  c
# -91 -92
```

```
recodeValues(x, to = "Stata", dictionary = c(a = -91, b = -92))
```

```
#      A      B      C
# 1    1      1      1
# 2    2      2 NA(a)
# 3    3      3      3
# 4    4      4      4
# 5    5      5      5
# 6 NA(b) NA(a) NA(b)
```

```
recodeValues(x, to = "SPSS")
```

```
#      A      B      C
# 1    1      1      1
# 2    2      2 NA(-91)
# 3    3      3      3
# 4    4      4      4
# 5    5      5      5
# 6 NA(-92) NA(-93) NA(-92)
```

```
recodeValues(x, to = "SPSS", dictionary = c(a = -91))
```

```
#      A      B      C
# 1    1      1      1
# 2    2      2 NA(-91)
# 3    3      3      3
# 4    4      4      4
# 5    5      5      5
# 6 NA(-92) NA(-91) NA(-92)
```

 setupfile

 Create setup files for SPSS, Stata, SAS and R

Description

This function creates a setup file, based on a list of variable and value labels.

Usage

```
setupfile(codeBook, file = "", type = "all", csv = "", OS = "", ...)
```

Arguments

codeBook	A list object containing the metadata, or a path to a directory where these objects are located, for batch processing
file	Character, the (path to the) setup file to be created
type	The type of setup file, can be: "SPSS", "Stata", "SAS", "R", or "all" (default)
csv	The original dataset, used to create the setup file commands, or a path to the directory where the .csv files are located, for batch processing
OS	The target operating system, for the eol - end of line character(s)
...	Other arguments, see Details below

Details

When the a path to a metadata directory is specified for the argument codebook, then next argument file is silently ignored and all created setup files are saved in a directory called "Setup Files" that (if not already found) is created in the working directory.

The argument file expects the name of the final setup file being saved on the disk. If not specified, the name of the object provided for the codebook argument will be used as a filename.

If file is specified, the argument type is automatically determined from the file's extension, otherwise when type = "all", the function produces one setup file for each supported type.

If batch processing multiple files, the function will inspect all files in the provided directory, and retain only those with the extension .R or .r or DDI versions with the extension .xml or .XML (it will subsequently generate an error if the .R files do not contain an object list, or if the .xml files do not contain a DDI structured metadata file).

If the metadata directory contains a subdirectory called "data" or "Data", it will match the name of the metadata file with the name of the .csv file (their names have to be *exactly* the same, regardless of their extension).

The csv argument can provide a data frame object produced by reading the .csv file, or a path to the directory where the .csv files are located. If the user doesn't provide something for this argument, the function will check the existence of a subdirectory called data in the directory where the metadata files are located.

In batch mode, the code starts with the argument `delim = ", "`, but if the .csv file is delimited differently it will also try hard to find other delimiters that will match the variable names in the

metadata file. At the initial version 0.1-0, the automatically detected delimiters include ";" and "\t".

The argument OS (case insensitive) can be either:

"Windows" (default), or "Win",
 "MacOS", "Darwin", "Apple", "Mac",
 "Linux".

The end of line character(s) changes only when the target OS is different from the running OS.

Value

A setup file to complement the imported raw dataset.

Examples

```
codeBook <- list(dataDscr = list(
  ID = list(
    label = "Questionnaire ID",
    type = "num",
    measurement = "interval"
  ),
  V1 = list(
    label = "Label for the first variable",
    labels = c(
      "No" = 0,
      "Yes" = 1,
      "Not applicable" = -97,
      "Not answered" = -99),
    na_values = c(-99, -97),
    type = "cat",
    measurement = "nominal"
  ),
  V2 = list(
    label = "Label for the second variable",
    labels = c(
      "Very little" = 1,
      "Little" = 2,
      "So, so" = 3,
      "Much" = 4,
      "Very much" = 5,
      "Don't know" = -98),
    na_values = c(-98),
    type = "cat",
    measurement = "ordinal"
  ),
  V3 = list(
    label = "Label for the third variable",
    labels = c(
      "First answer" = "A",
      "Second answer" = "B",
```

```
        "Don't know"      = -98),
    na_values = c(-98),
    type = "cat",
    measurement = "nominal"
),
V4 = list(
  label = "Number of children",
  labels = c(
    "Don't know"      = -98,
    "Not answered"   = -99),
  na_values = c(-99, -98),
  type = "numcat",
  measurement = "ratio"
)))

## Not run:
# IMPORTANT:
# make sure to set the working directory to a directory with read/write permissions
# setwd("/path/to/read/write/directory")

# path.to.csv <- file.path(system.file(package = "DDIwR"), "data", "test.csv.gz")

setupfile(codeBook)

# if the csv data file is available
setupfile(codeBook, csv="/path/to/csv/file.csv")

# generating a specific type of setup file
setupfile(codeBook, file = "codeBook.do") # type = "Stata" is unnecessary

# other types of possible utilizations, using paths to specific files
# an XML file containing a DDI metadata object

setupfile("/path/to/the/metadata/file.xml", csv="/path/to/csv/file.csv")

# or in batch mode, specifying entire directories
setupfile("/path/to/the/metadata/directory", csv="/path/to/csv/directory")

## End(Not run)
```

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